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PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference INF 1559-PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/000087	International filing date (day/month/year) 08 January 2003 (08.01.2003)	Priority date (day/month/year) 15 January 2002 (15.01.2002)
International Patent Classification (IPC) or national classification and IPC H01L 21/033		
Applicant INFINEON TECHNOLOGIES AG		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☐ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 14 August 2003 (14.08.2003)	Date of completion of this report 04 February 2004 (04.02.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

/EP2003/000087

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
pages 1-9, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☒ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages 1-9, filed with the letter of 15 January 2004 (15.01.2004)
- ☒ the drawings:
pages 1/2-2/2, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/ 03/00087

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	1	YES
	Claims		NO
Inventive step (IS)	Claims	1	YES
	Claims		NO
Industrial applicability (IA)	Claims	1	YES
	Claims		NO

2. Citations and explanations

The English-language abstract and drawings of JP-A-63 281 441 (D1) are regarded as the prior art closest to the subject matter of claim 1. D1 discloses (the references in parentheses are to D1):

method for masking first recesses (left recess in figure 2(b)) in a structure which have a large aspect ratio from a number of recesses (left recess and right recess in figure 2(b)) with different aspect ratios, said method having the following steps:

- a filler layer (24) is applied to the structure in such a way that a hollow space (25) is formed in first recesses with a large aspect ratio;
- the filler layer (24) is removed up into the region of the hollow space (25) (since the filler layer is completely removed from the recess with the large aspect ratio by means of an etching process, first an intermediate stage is attained in which the filler layer has been removed up into the region of the hollow space);
- the filler layer (24) is removed in an etching process, the etching process also being carried out in the hollow space (25) and, owing to the hollow space (25),

the filler layer (24) being removed more quickly from the first recess than from recesses without a hollow space. The etching process is stopped after the filler layer (24) has been removed from the first recess (see in particular figure 2(d)).

Thus the subject matter of claim 1 differs from this known method in that

- the step in which the filler layer is removed up into the region of the hollow space is carried out by means of a planar removal process, the filler layer being removed up to a predetermined distance above the surface of the flanges;
- and the predetermined distance being selected such that the flanges are not underetched in the region of a recess with a small aspect ratio.

The subject matter of claim 1 is therefore novel (PCT Article 33(2)).

Thus the problem to be solved by the present invention can be regarded as that of ensuring that only recesses with a large aspect ratio are uncovered.

The solution to this problem as proposed in claim 1 of the present application involves an inventive step for the following reasons (PCT Article 33(3)):

The prior art does not suggest removing the filler layer by first using a planar removal process and then using an etching process. Furthermore, underetching of the flanges in the region of the recesses with a small aspect ratio seems to be desired in D1, and a modification of the method disclosed in D1 as per the present claim 1 is also not obvious for this reason.